

ABSTRACT

The present invention includes a transgenic plant containing a GDP-mannose pyrophosphorylase gene. A pathway for AsA biosynthesis that features GDP-mannose and L-galactose has recently been proposed for plants. A collection of AsA-deficient mutants of *Arabidopsis thaliana* that are valuable tools for testing of a novel AsA biosynthetic pathway have been isolated. The best characterized of these mutants (*vtc1-vitamin c*) contains ~25% of wildtype AsA and is defective in AsA biosynthesis. Using a combination of biochemical, molecular, and genetic techniques, it has been conclusively demonstrated that the *VTC1* locus encodes GDP-mannose pyrophosphorylase (mannose-1-P guanyltransferase). This enzyme provides GDP-mannose, which is used for cell wall carbohydrate biosynthesis and protein glycosylation as well as for AsA biosynthesis.